NOVEMBER/DECEMBER 2023

23PEPH14B — CRYSTAL GROWTH AND THIN FILMS

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Distinguish between homogeneous and heterogeneous formation of nuclei.

2. Mention the different types of nucleation.

3. What is meant by solubility? *

4. Is the constant temperature bath essential for the growth of the crystal? Justify.

5. List out the various types of gel.

6. Differentiate PVD and CVD.

7. List out the applications of thermal evaporation technique.

8. What s meant by sputtering?

9. How does the capillarity model differ from the atomistic model?

10. Why is interferometry useful?

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SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions.

11. (a) Examine the rate of nucleation when the crystals were grown from vapour phase and melt.

Or

(b) Discuss the formation of critical nuclei in detail.

12. (a) Obtain the expression for supersaturation.

Or

(b) Illustrate the Miers TC diagram with a neat sketch.

13. (a) How crystals can be grown from the Czochralski method.

Or

(b) Discuss the various methods of gel growth.

14. (a) How will you form the thin films by thermal evaporation technique.

Or

(b) How thin films can be prepared by pulsed laser deposition technique.

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15. (a) Enumerate the various stages involved in the formation of thin films.

Or

(b) Assess the role of substrate and film thickness in forming the thin films.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain in detail about the classical theory of nucleation.

17. Describe the growth of crystals by low temperature solution growth technique with a neat sketch.

18. Explain the construction and working of Bridgman technique in detail.

19. Discuss in detail about the spray pyrolysis technique in forming the thin films. List out its advantages and disadvantages.

20. Explain the working principle of Quartz Crystal Oscillator technique with a neat diagram.
